I. PROJECT GOALS AND OBJECTIVES.

Algenol Biofuels Inc. ("the Company") is developing and intends to commercialize DIRECT TO ETHANOL™ technology invented by Mr. Paul Woods and Dr. John Coleman between 1984 and 1996 and patented in the U.S. in 2001 and 2004 (US Patent Nos. 6,306,639 and 6,699,696). DIRECT TO ETHANOL™ technology uses hybrid algae that make ethanol from carbon dioxide. More than $70 million in investment capital has been secured from Algenol's founders to finance the initial development of DIRECT TO ETHANOL™ technology. Over the last three years about $30 million of this capital has been invested in research and development, and the technology is now ready for advancement to a pilot-scale integrated biorefinery. By means of this response to DOE Funding Opportunity Announcement Number DE-FOA-0000096 Algenol is seeking financial support to build and operate a pilot-scale DIRECT TO ETHANOL™ integrated biorefinery.

Project Goals and Objectives:

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Specific Aims and Targets:

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II. COMPANY DESCRIPTION.

Algenol Biofuels Inc. is a Delaware corporation with headquarters in Naples, Florida. Algenol has assembled a team of more than 100 employees and consultants to develop its technology from proof-of-principle to commercialization. The Company's management team has extensive experience in the energy

and biotechnology industries and has founded, financed, and built several successful publicly traded companies. The Company employs molecular biologists, marine biologists, biochemists, mechanical engineers, chemical engineers, financial professionals and project managers, including more than 40 Ph.D.'s. The Company employs two full time patent attorneys and has retained external patent law firms to represent its interests in jurisdictions both inside and outside of the United States. Algenol has an Advisory Board of distinguished scientists and engineers that actively advise the Company and has developed a broad range of research collaborations with leading academic institutions, such as The Georgia Institute of Technology, The University of Maryland Center for Marine Biotechnology, and the University of Hawaii.

The Company has research laboratories in Baltimore, Maryland and Germany that enhance and maintain selected hybrid algae for ethanol production. Both laboratories are equipped with state-of-the-art analytical technology and specialized algal growing rooms, as well as bench-top photobioreactors of varying designs from 0.5-liter to 80-liter capacity. The Company also has an advanced engineering lab in Baltimore where development, design and testing of photobioreactor, ethanol extraction and other system components are carried out.

The Company also operates a zero discharge, licensed aquaculture facility for research and development on five acres in Palm Beach County, Florida. This facility has a fully equipped laboratory and scientific staff on site and has already tested multiple photobioreactor designs and developed expertise in growing algae at large scale for more than a year under field conditions. Algenol is currently installing a Process Development Unit with 40 prototype commercial 4,500-liter bioreactors for the next phase of scale up and process development. Installation and initial operations will be completed by August 2009.

Figure 1: Algenol's Process Development Unit currently under construction in Florida

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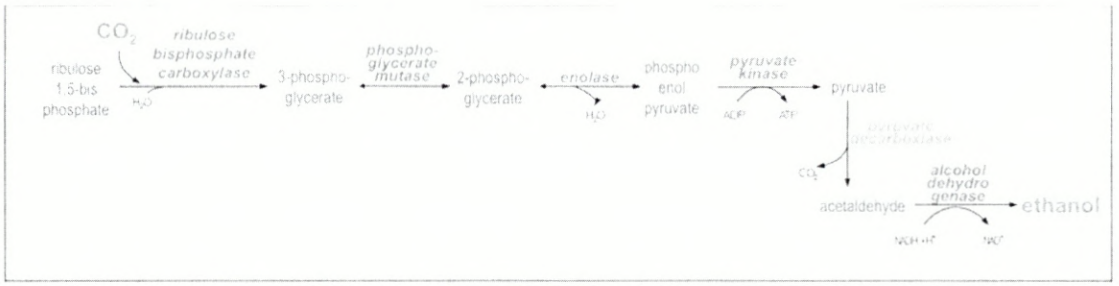
III. TECHNOLOGY AND PROCESSES.

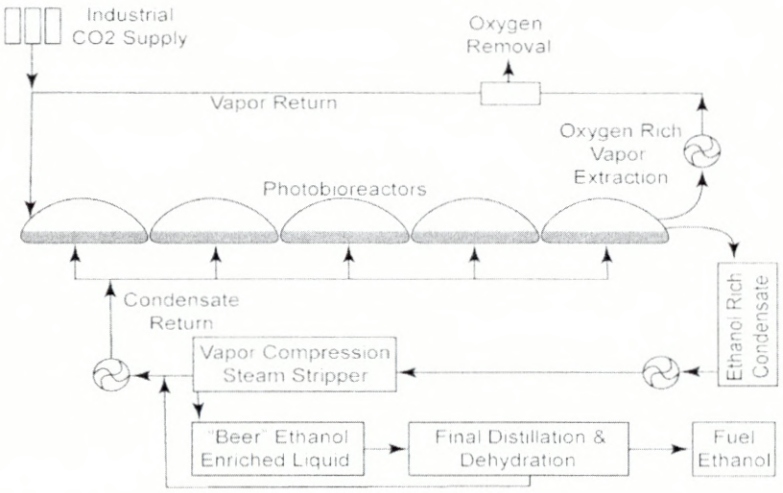
DIRECT TO ETHANOL™ technology involves over-expressing in blue-green algae the genes for fermentation pathway enzymes found widely in nature. These enzymes are pyruvate decarboxylase and alcohol dehydrogenase. The resulting metabolically enhanced hybrid algae actively carry out photosynthesis and utilize carbon dioxide as the feedstock for making ethanol inside each algal cell. The biochemical pathway for producing ethanol in the hybrid algae is shown in Figure 2.

Figure 2: Metabolic Pathway for Ethanol Production



The ethanol made inside the cell diffuses through the cell wall into the culture medium and then evaporates, along with water, into the headspace of an enclosed, sealed photobioreactor. The ethanol-water vapor condenses on the inner surface of the bioreactor headspace and is collected by gravity, concentrated, and then distilled into fuel grade ethanol.

Figure 3: Simple diagram of the DIRECT TO ETHANOL™ process



The central component of the DIRECT TO ETHANOL™ process is a proprietary 4,500 liter 5' x 50' flexible film photobioreactor made of polyethylene film with special additives and coatings. The photobioreactor contains seawater that has been treated to remove particulates and contaminants, added nutrients, and a large headspace above the seawater. The photobioreactor is inoculated with several gallons of a dense hybrid algae culture produced from stocks maintained in greenhouses on site. After hybrid algae inoculation, carbon dioxide from industrial emissions is introduced into the photobioreactor. The outdoor photobioreactor is exposed to sunlight that causes the algae to undergo photosynthesis, absorb carbon dioxide and produce ethanol. Because of the solar heat that accumulates in the photobioreactor, ethanol along with water evaporates into the headspace. Upon contact with the plastic film, the vapor condenses, runs down the sides of the

photobioreactor, and is collected in troughs that carry the ethanol-enriched condensate, by gravity, into a collection system. The ethanol-water mixture leaving the photobioreactor has an ethanol concentration of 0.5 to 2 percent (weight). The ethanol rich condensate is then pumped through a proprietary vapor compression steam stripping (VCSS) unit that further increases the ethanol concentration to ~35% (weight) producing an intermediate "beer" for further processing. If fuel ethanol is the desired product, the beer is processed through a conventional ethanol distillation system and subsequently dewatered by molecular sieves to produce fuel grade ethanol. Alternatively, the intermediate beer can be distilled to an 85% ethanol concentration and shipped to chemical companies for processing into ethylene, polyethylene, or many other biological polymers and co-products. For the purpose of validating this technology in the integrated biorefinery under this DOE FOA, this specific project will produce fuel ethanol from the intermediate beer. None of the intermediate beer will be processed into polyethylene or other polymers.

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The Company now has more than 300 algal strains capable of producing ethanol and has an active research effort to produce more such strains. Specific candidate strains for further scale up for pilot scale production have been selected. The productivity of these algae is currently being evaluated in 1-liter to 80-liter laboratory photobioreactors and in multiple 300-liter outdoor photobioreactors under external environmental conditions.

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IV. PROJECT DESCRIPTION.

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Major Participants:

One of Algenol's Specific Aims in this project is to assemble a consortium of private industry, federal laboratories, and academic institutions that will contribute to the development and operation of the Algenol pilot-scale integrated biorefinery. Algenol has accomplished this goal by signing collaborative agreements with The Dow Chemical Company, The National Renewable Energy Laboratory (NREL), Membrane Technology & Research Inc. (MTR), and The Georgia Tech Strategic Energy Institute, a division of The Georgia Institute of Technology (Georgia Tech). MTR is currently conducting a 6-month engineering design study of various ethanol-water separation technologies, including computer process simulations. This research will be completed by October 2009. Georgia Tech has completed the analysis of the life-cycle environmental impacts of Algenol's process included in this proposal.

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Critical Success Factors:

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V. Business Model and Forecast Commercial-scale Integrated Biorefinery Summary.

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Forecasted Commercial-scale Integrated Biorefinery Summary:

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VI. American Recovery and Reinvestment Act of 2009, P.L. 111-5 (Recovery Act) Information.

Algenol's pilot-scale integrated biorefinery will create jobs and economic growth, adding hundreds of millions of dollars of economic output to local and regional economies. Fishkind & Associates, Inc. conducted an economic impact study for a hypothetical integrated 40,000-acre, 250 million gallon per year DIRECT TO ETHANOL™ integrated biorefinery located in Texas. The analysis assumed the integrated biorefinery is built over 4-5 years in 8,000-acre increments or phases and that each phase is operational after construction. Impacts were measured separately for the construction and operational periods and were categorized as outputs (value added dollars and wages spent and re-spent), earnings (direct and indirect wages), and employment. During the three-year construction period, the project would generate $1.1 billion in total economic output and would reach a peak employment of 3,097 jobs. At completion, the project would annually generate $702.6 million in total economic output and create 2,830 permanent jobs. Algenol is targeting production of 10-20 billion gallons of ethanol by 2025. At these production levels the total economic impact is more than $40 billion per year and more than 100,000 jobs.

VII. Value Proposition.

Algenol's DIRECT TO ETHANOL™ technology also offers a compelling value proposition to consumers, the global environment, potential investors, and the United States.

Algenol today possesses the most advanced third generation biofuel technology in the United States. Algenol makes low cost ethanol directly from CO_2 and seawater using hybrid algae in sealed, clear plastic photobioreactors through its unique, patented Direct to Ethanol™ technology – all powered by the sun. Importantly, this is done without processing or transporting a separate biomass. At its core, Algenol has several components that come together in an integrated biorefinery from upstream CO_2 to final fuel grade ethanol product.

Algenol brings to this project significant capabilities and experience of its own and, together with its world-class partners, seeks to accelerate the commercialization of its Direct to Ethanol™ technology through application for funding by the Department of Energy.

Algenol's technology has culminated in hybrid algae that produce over 6,000 gallons of ethanol per acre per year, compared to corn at 400. Algenol's process achieves an energy balance of over 5 to 1 and a Life Cycle Carbon Analysis in a practical case that demonstrates that Algenol's Direct to EthanolTM production process has a carbon footprint that is merely 20% of petroleum (an 80% reduction from petroleum). Algenol intends to build commercial scale facilities that can produce ethanol for under $1.50 per gallon. Our group of people, companies, and institutions are extraordinarily talented and possess diverse skills that ensure Algenol can not only execute on its plan to build both this pilot-scale integrated biorefinery, but Algenol will bring the technology to commercial scale in under 5 years.

To the US government, we offer a method to make domestic transportation fuel that can make a substantial contribution to U.S. energy security, or at least free the U.S. from price volatility or supply restrictions based on the market dominance of the Organization of the Petroleum Exporting Countries (OPEC). We believe the DIRECT TO ETHANOL™ process could allow the U.S. to make 40-50 billion gallons of transportation fuel on as little as 100 miles square of desert or marginal land in the southern tier of the US. Presently, OPEC countries supply the U.S. with approximately 40 billion gallons of transportation fuel per year. We could replace the oil from unstable foreign sources with fuel produced here in the U.S.

To potential investors we offer an excellent business opportunity. Ethanol product pricing will be set by the commodity market and is expected to exceed a rack price of $2.50 per gallon of E85 by 2012. At these prices we could have net profit margins (after tax) in excess of 20% and a process that could be scaled to 50 billion gallons per year or more. If successful, the resultant return on investment would warrant the risks associated with an investment in Algenol's DIRECT TO ETHANOL™ technology.

Algenol will employ thousands of people in the future, and many at very high wages. Algenol has detailed conceptual blueprints completed for the pilot-scale integrated biorefinery on Dow's land in Freeport Texas. Algenol has completed detailed engineering work as well. In our application we allow 11 months for Award Budget Period One (often referred to as Phase I), and this is largely due to getting permits and through the DOE approval process. Algenol, with the DOE's assistance, is largely ready to build a pilot-scale integrated biorefinery today and most certainly as soon as possible after the award.

Algenol has already demonstrated its ability to attract the very best talent, execute on its plan, and scale up working systems, all of these lead to a successful pilot-scale integrated biorefinery and ensures that the DOE's accomplishes its goal as well.

Algenol Biofuels Inc.

Intellectual Property Statement

Background:

Algenol Biofuels Inc. is developing and commercializing Direct to Ethanol™ technology invented by Mr. Paul Woods and Dr. John Coleman between 1984 and 1996 and patented in the U.S. in 2001 and 2004 (US Patent Nos. 6,306,639 and 6,699,696). Direct to Ethanol™ technology involves over-expressing in blue-green algae (cyanobacteria) the genes for fermentation pathway enzymes (pyruvate decarboxylase and alcohol dehydrogenase). These enzymes are found widely in nature. The resulting enhanced algae actively carry out photosynthesis and utilize carbon dioxide, sunlight and water to make ethanol inside each algal cell. The ethanol made inside the cell diffuses through the cell wall into the culture medium and then evaporates, along with water, into the headspace of an enclosed, sealed photobioreactor designed by Algenol. The ethanol-water vapor is harvested from the photobioreactor, ethanol is separated from the ethanol-water vapor, and then condensed and distilled into fuel grade ethanol.

Algenol has assembled a team of more than 100 employees and consultants to develop the technology from proof-of-principle to commercialization, including molecular biologists, marine biologists, biochemists, mechanical and chemical engineers, project managers and two full time patent attorneys. Since inception, the Company has filed several provisional and non-provisional patent applications covering recent inventions in the field and expects to continue this practice for the foreseeable future. In addition to the technologies for which the Company has obtained, or is pursuing, a patent, it has amassed significant knowledge and trade secrets related to the above detailed Direct to Ethanol™ technology.

All of the IP necessary to complete this project is owned, and has been developed, by Algenol and its wholly owned subsidiaries. Rights to use, commercialize and license the technology reside solely with Algenol. The above referenced patents were originally assigned to Enol Energy Inc., a Company started by Mr. Woods, which has since become a wholly owned subsidiary of Algenol. The license agreements transferring the rights to the technology to Algenol grants exclusive, worldwide, royalty-free right and license to use, sell, manufacture and otherwise commercialize the technology. Mr. Woods, pursuant to the agreement, assigned his rights to the technology to Algenol. Below please find further details regarding Algenol's patents and patent applications.

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The following patents and patent applications are owned by Algenol:

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In each instance, the inventors of the intellectual property that is the subject of these patents have either been an employee or a consultant of Algenol, or one of its wholly owned subsidiaries, at the time of the invention. Algenol's standard employment agreements and consulting agreements include the following language, or language substantially the same:

Proprietary Rights. All work arising from the Services performed hereunder all materials and products developed or prepared for Company by Employee in connection with the Services performed hereunder, and all resulting inventions, discoveries, processes, ideas, methods, designs, know-how, whether or not patentable, and other copyrightable materials (all of the foregoing being referred to as "Work Product") are the exclusive property throughout the world of Company, and all right, title and interest therein shall vest in Company and are hereby assigned to the Company. Whenever requested to do so by Company or any subsidiary and/or affiliate thereof, at Company's expense, and without further compensation or consideration, Consultant shall promptly execute any and all applications, assignments and other instruments and perform such acts which Company shall deem necessary or advisable in order to apply for and obtain copyrights, letters, patents and other applicable statutory

In addition to the above detailed patents and patent applications, Algenol has filed patent applications for these inventions in international jurisdictions, including Europe, Canada, Australia and the World Intellectual Property Organization.

Discussion:

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ALGENOL BIOFUELS INC.

Project Execution Plan

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Proprietary Information: All information in this document is proprietary. Algenol Biofuels requests all information in this document not be released to persons outside the Government, except for the purposes of review and evaluation.

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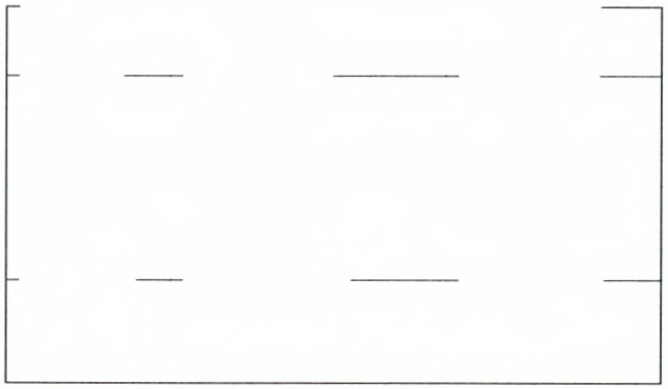

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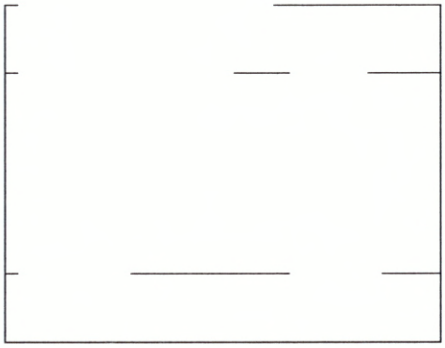

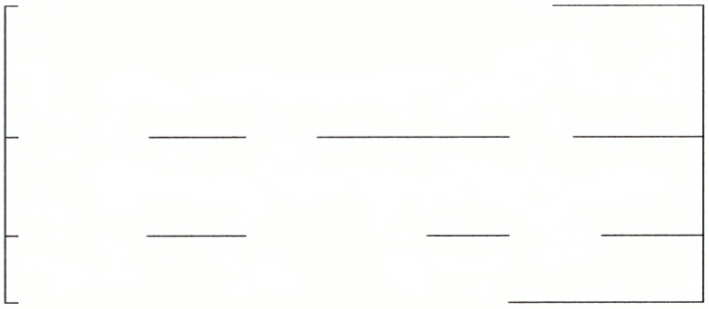

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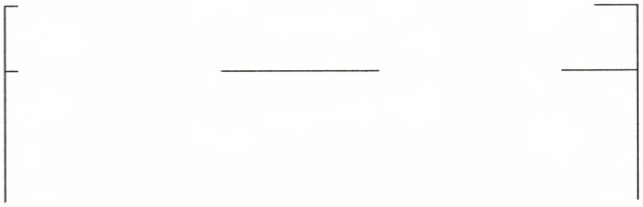

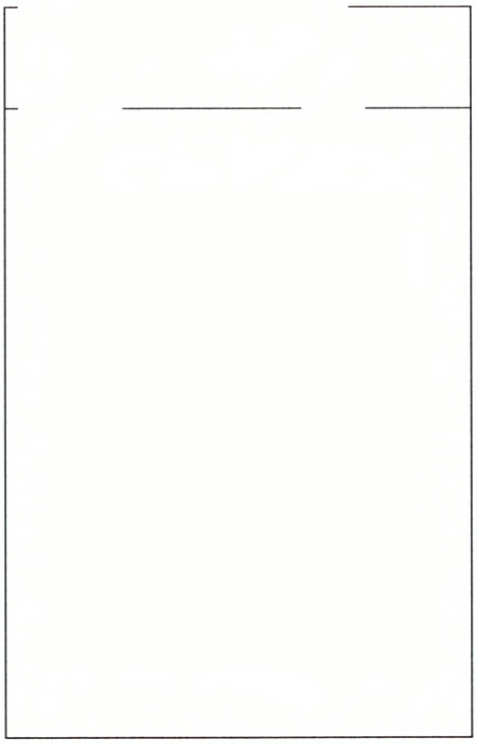

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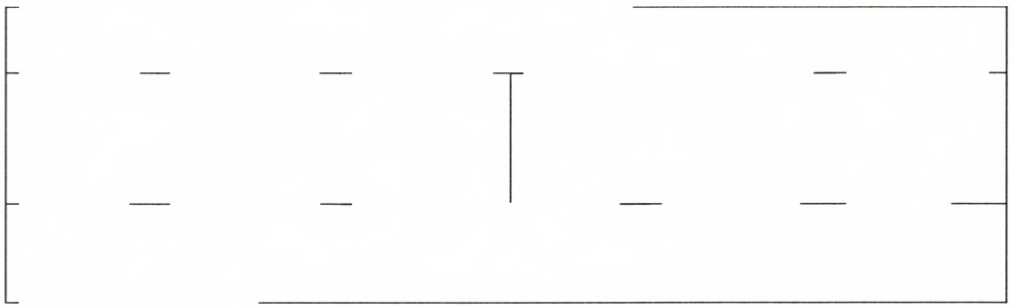

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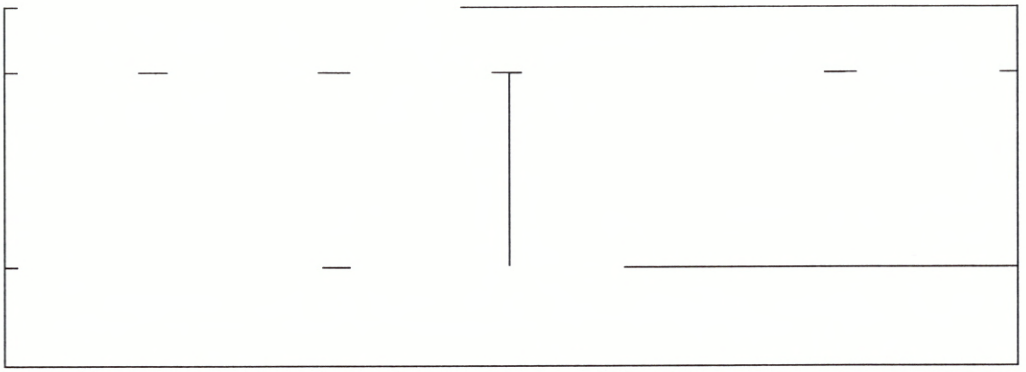

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